Introduction:

The Planetary waves that are propagating upwards leaves its signatures by causing variations in the winds, composition, pressure and temperature. Planetary waves play a major role in large-scale longitudinal variability. Planetary waves are eitherimmobile or propagatelongitudinallyhave periodicity ranging from few days to weeks. They superimpose with other waves in the atmosphere. Theplanetary waves with High amplitude would result in suddenchanges in thewinds and temperature. They play acrucial role in troposphere and Stratosphere. Atmospheric variabilities across all Latitudes and Longitudes. Thesewaves. transpire in rotating fluids and are engendered in Earth's ocean and atmosphere, as a consequence of planetary rotation. Planetary waves are also called Rossby Waves which are unalike from ocean surface waves. Rossby waves are Large, heaving movement of ocean. extending horizontally transversely the planet in westward direction. Rossby waves propagate upwards coupling different layers of the atmosphere effecting their dynamics which also effects the Earth's Climate conditions.

Earth's atmosphere is composed of fiveforemost and numerous secondary layers. From lowest to highest, the main layers are the troposphere, stratosphere, mesosphere, thermosphere and exosphere.

Troposphere: The Bottom most layer of the Earth's atmosphere is Troposphere whose altitude varies at poles and equator. On an average it extends upto 12 Km, its height is lower at Poles and higher at Equator. The Earth's weather entirely depends upon the Trophosphere dynamics. The temperature decreases with Height in Troposphere and it is highly dense Atmospheric layer.

Stratosphere: It is the second most bottom layer of Earth's Atmosphere ranging from approximately 12 to 50 Km. It houses ozone layer, which shields from harmful UV

Radiation. As the height rises in Stratosphere, the temperature increases. It is almost cloud and Weather – free but Polar Stratospheric clouds are occasionallyexisting in lowest, coolest altitudes.

Mesosphere: It is the middle atmospheric layer extending from 50-80 Km. in this layer the temperature increases with increasing in altitudes. Its temperature falls to -80^0 C. It is less dense and most of the particles are present in neutral form.

Thermosphere: It ranges from 80 and 700 kilometres above the Earth's surface. It is divided into different layers referred as ionospheric – D,E,F layers depending upon Ion Density. The temperatures increase with altitude. The thick dense electron layer is formed at an altitude of 300-350 Km which plays a major role in Satellite Signal Communications. During the Stratosphere warmings, the TEC is found to increases.

Exosphere: It is at an altitude ranging between ~ 700 Km to 10,000 Km above Earth's surface. It is the uppermost layer of Earth's atmosphere and, at its upper layerunites with the solar wind. It is a low-density region hence this layer doesn't act like a gas, and particles here outflow into space. This layer is weather – free.The aurora borealis and aurora australis are occasionally seen in its lowermost part. Most Earth satellites orbit in the exosphere.

INSTRUMENTATION:

The planetary waves observations are carried out using the satellite systems, Ground based Radar Observations. Balloon Flight Experiments and Model Data.

GPS: The atmospheric parameters like temperature, pressure, humidity, water vapour are measured using the constellation of satellites like GPS Systems. Large number of GPS receivers are installed Globally and the data is available in SOPAC. For every 30 sec. data from atleast 12 satellites is recorded by the receivers which are distributed across all the Latitudes and Longitudes. Hence for every hour 120 data sets are available over a site from 12 satellites revolving around the Earth in Geo Stationary Orbits.

RADAR OBSERVATIONS: Multi wavelength Radars operating in Medium frequency ranges and low frequency ranges are suitable for observing atmospheric parameters. These insituObservations play a vital role in determining, predicting the atmospheric dynamics. They work on the principles of Doppler Effect. The Radars are VHF, MF, LF Radars are globally distributed (SKYiMET Radar, MST Radars, ST Radars). The data is available on the respective sites and is provided upon requests.

BALLOON FLIGHT EXPERIMENTS (Radio Sonde and Iono Sonde): The balloon flights are periodically performed alighting temperature, pressure, wind sensors. The continuous monitoring of the balloon flight is done using a software. The data from these sensors is collected at 1m resolution and till the balloon reaches saturation heights the data is collected. After reaching sufficient height the balloon blasts in the atmosphere.

MODEL DATA: The re-analysis data is available for all latitudes and longitudes 24/7 at all pressure levels from surface.

KEY POINTS:

- Planetary waves are dramatic events of the polar stratosphere that affect the atmosphere from the surface of the Thermosphere.

- Our understanding of Planetary waves has accelerated recently. Particularly the predictability of the surface weather effects.
- More observations, improved climate models, and big data methods will address uncertainties in the key aspects of Planetary Waves which result in sudden stratosphere warming.

PROPOSED RESEARCH WORK:

The present work is emphasized on studying The effect of Planetary waves on Global Climatology at Polar and tropical regions.